AbstractID: 5560 Title: Dosimetric evaluations of organs at risk for head and neck cancer patients during entire IMRT treatment course

Purpose: Significant anatomic changes occur during radiotherapy treatment course for head and neck cancer patients. The purpose of this study is to evaluate the dosimetric changes by estimating the cumulative doses to critical organs. The finding will help better understand the uncertainties in initial plans and decisions making for replanning.

Method and Materials: Patients treated with IMRT at our institution are immobilized on MedTec IPPS for simulation, CT and treatment. Guidelines from RTOG protocol are followed in defining target and organs at risk (OAR) volumes. Weekly helical CTs are acquired and fused to planning CT based on bony anatomy. Therefore, effect of setup error is excluded. OARs are delineated by a single physician manually on each CT. Dose distributions are recomputed for each CT using same beams from initial plan. Dose is evaluated for each CT and cumulative dose is estimated and compared with the original plan.

Results: Up to 10% reduction on skin volume is observed for a single patient. However the average reduction is only 2%, because bony structures are fairly stable and shrinkage only occurs in soft tissues. The cumulative maximum doses to cord, brainstem and mandible, expressed as the ratio to initial plan, are 1.00±0.03, 1.01±0.08, and 1.01±0.08 respectively. The changes are minimal. For parotid glands, mean dose and V_{30} (volume to 30 Gy) can be increased by 10%, with up to 20% for a single patient. This is because parotid gland tends to move into the center of the field.

Conclusion: Repeated CT scans during treatment course allow more accurate evaluations of the dose distributions, which can be significantly different from original plan due to radiation response of tumor and soft tissue. The cumulative doses are more reliable in describing the actual doses delivered and can be used for correlative studies with clinical results.